

***ASCE Standard in Progress:***

***Collection, Administration, & Exchange of  
Newly Installed Utility Infrastructure Data***



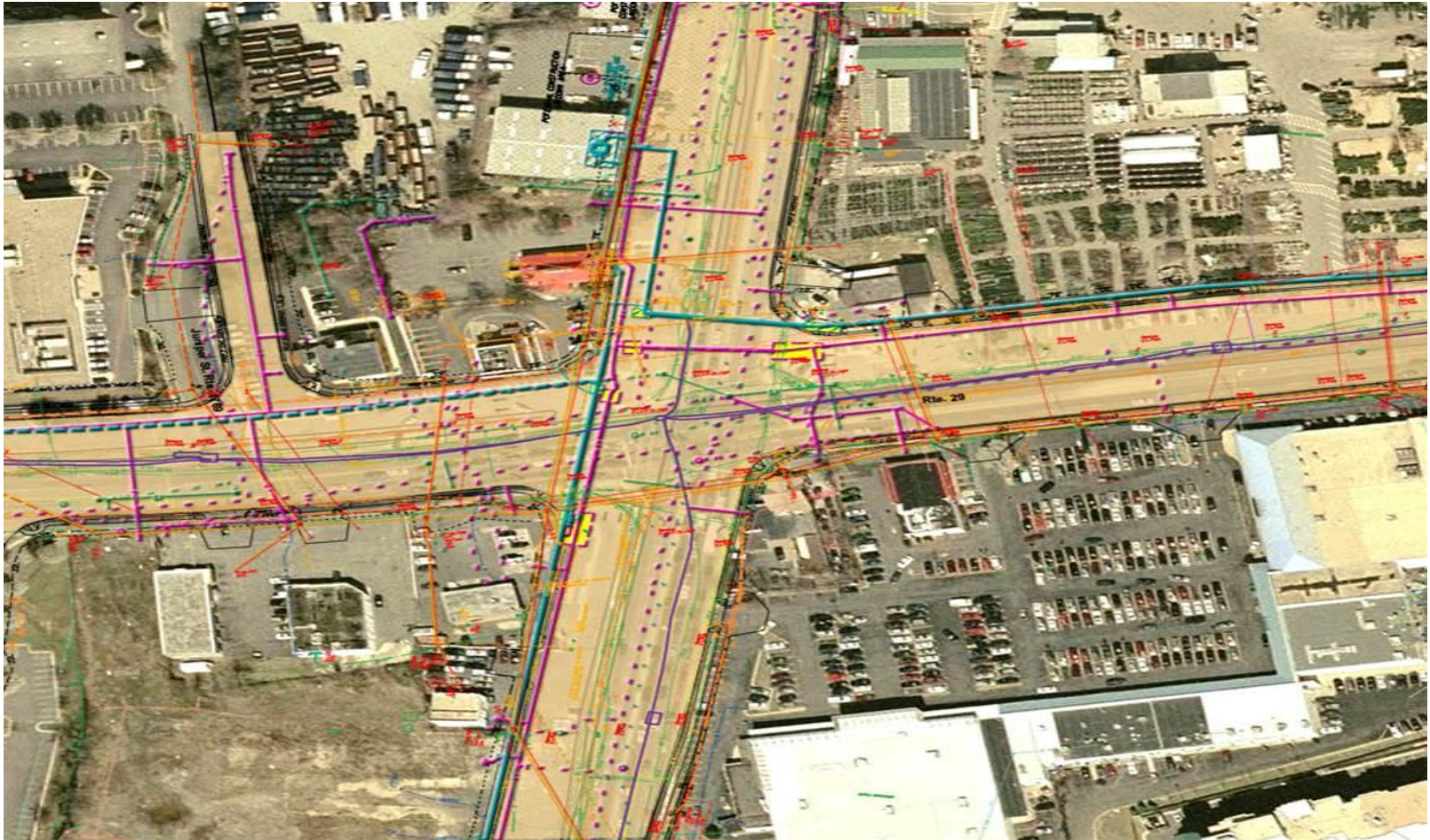
**Jim Anspach – Cardno**

**Chair: ASCE Construction Standards Council**

**Chair: Utility Engineering Committee**



Planned Relocations of Utilities in Color;  
95% of existing utilities (mapped using ASCE 38) will remain in place







# Background

- ◆ Nearly all agencies granting permits mandate permittees (i.e., facility owners) to provide upon request “accurate” utility record information for permitted installations.
- ◆ Not all agencies, however, have a standard process for acquiring or a standard format for submitting the information.

T 228(9/97)

UTAH DEPARTMENT OF TRANSPORTATION  
PERMIT

HIGHWAY RIGHT OF WAY  
ENCROACHMENT  
Region 3

App ID: 35372 Activity: Function: 8428  
R3-098428-0  
Date: 12/7/2009

Application of: Utility Mapping Services Inc.  
By: Cameron Greer, Staff Engineer/Project Manager  
Address: 2698 South Redwood Rd. Unit O West Valley City, UT 84119 Work (801) 910-5366  
UDOT Permit 4 Page 3.jpg

is hereby granted subject to the Utah Department of Transportation's (UDOT's) Regulations For the Accommodation of Utilities on Federal Aid and Non Federal-Aid Highway Right-of-Way, R-35-34, 1997 Edition, and Protection of State Highway Rights of Way, Standard Specifications for Road and Bridge Construction, UDOT Specifications for Highway Construction, 1995 Edition, and UDOT's Manual on Uniform Traffic Control Devices, Instructions to Flaggers, the approved plan sheets, and any additional conditions set forth herein, permission for the purpose of Locating, marking and surveying existing utilities for UDOT project # S-0046(75115) (Inspector is Fred Pribe) within the right of way limits in the following locations: SR-40 at 200 North, from 200 east to 400 East, Roosevelt.

Highway 0040 Milepost .000 to .000 in/near Roosevelt, Duchesne county

The permittee work shall commence 12/7/2009 and shall be diligently prosecuted to completion. The work shall be completed and all disturbed surfaces or objects restored on or before 12/18/2009. In the event work is commenced under this Permit and the permittee fails or refuses to complete the work, UDOT may, at its election, correct any deficiencies or otherwise complete the permitted work at the expense of the permittee. Upon receipt of an invoice of the costs incurred by UDOT, permittee shall immediately pay the amount due. If an action is required to be filed in court to collect the amount due, permittee shall be liable for UDOT's costs and fees, including attorney's fees.

Before work permitted is commenced, the permittee shall notify the Inspector listed below, in (\*\*\*\*) 24 Hours before (\*\*\*\*). By applying for the Permit and UDOT issuing the Permit, permittee will comply with all instructions, conditions, requirements, and regulations of UDOT with respect to performance of the work described in the Permit. Permittee will properly control and warn the public of said work with UDOT's rights-of-way to prevent any accidents. Permittee shall defend, indemnify, and hold harmless UDOT from all damages or claims, including attorneys fees, arising out of any and all actions performed under this Permit by permittee, permittee's employees, agents or contractors, including failure to comply with terms and conditions in this Permit. Permittee shall pay for UDOT's inspection fees.

Permittee shall not perform any work on state highway rights-of-way beyond those areas of operation described on this Permit.

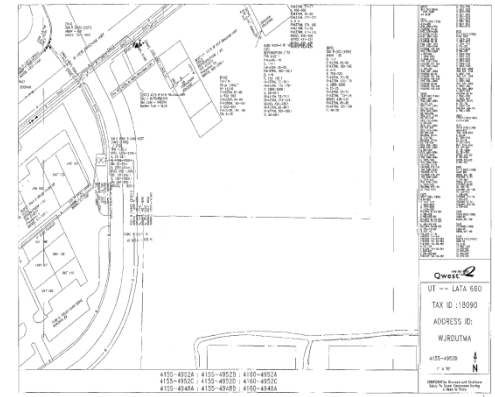
If permittee fails to comply with UDOT's regulations, specifications, or instructions pertinent to this Permit, the Region Director/District Engineer or his duly



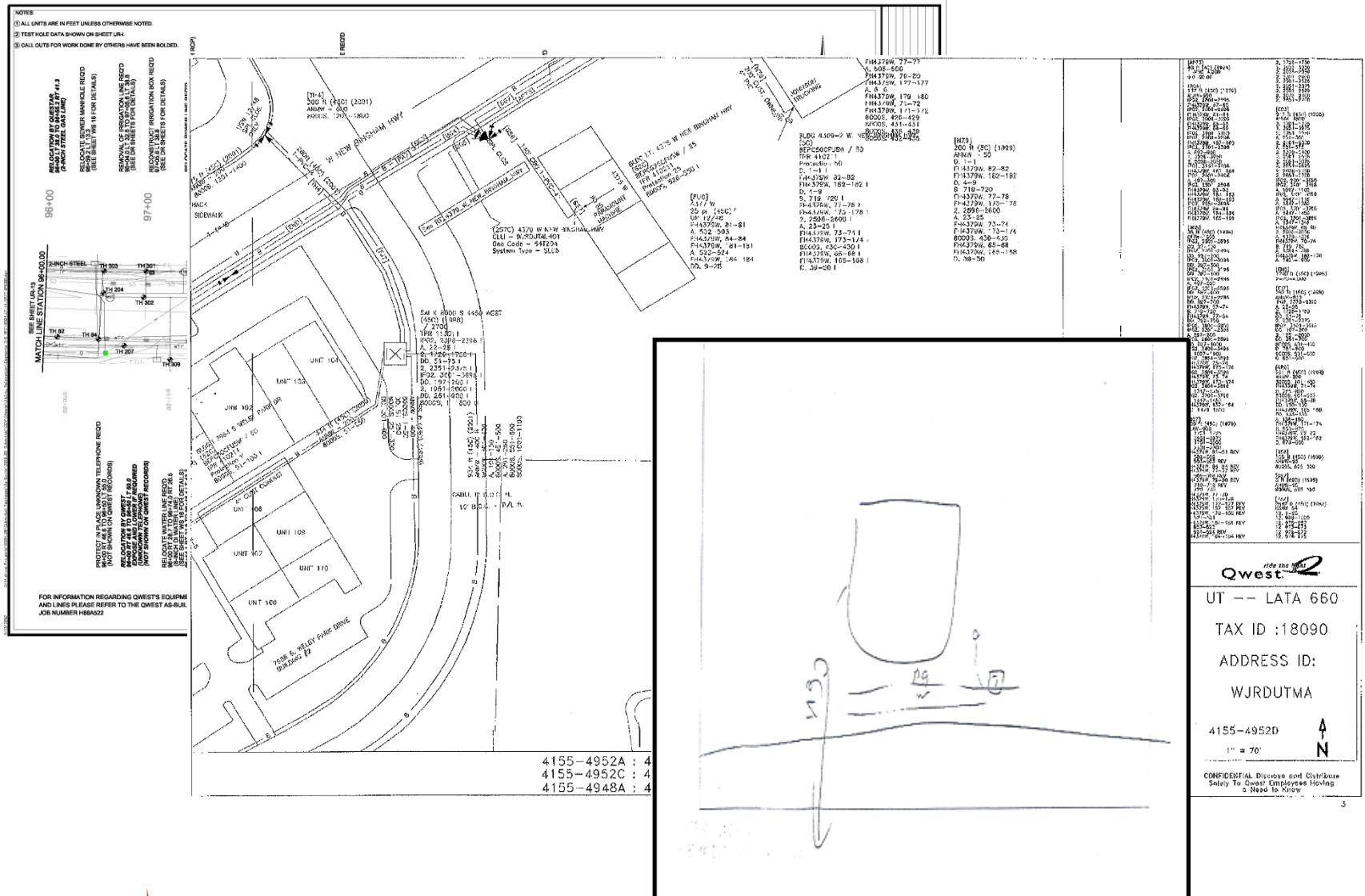
# Background

Accordingly utility records are largely:

- ◆ at an inventory / schematic level
- ◆ not tied to a common spatial datum
- ◆ of inconsistent quality and content
- ◆ in formats often incompatible for sharing or referencing into CADD or viewing platforms commonly utilized by agencies in charge of granting easements and managing the properties through which these easements pass



## Current As-Built Examples





# What's Changed?

Population growth

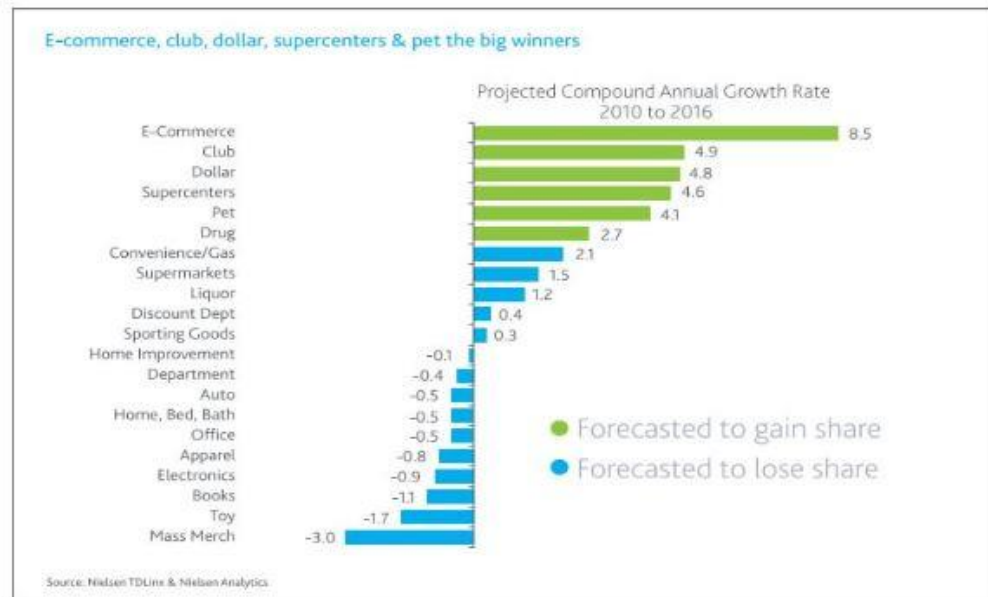
Public preference for buried cables

Utility deregulation

Unusual configurations

Rise in internet usage and dependence

- ◆ e-commerce boom
- ◆ cloud data management





# Web Use

- ◆ eCommerce
- ◆ Banking, Securities, Stocks
- ◆ Business Ops (Accounting, email, file)
- ◆ News, Entertainment, Social Networking
- ◆ Telecommunications / Cellular Services
- ◆ Advertisement / Marketing
- ◆ GPS-Map / GIS Services
- ◆ Education
- ◆ Data Management Services

## New Construction

- > In PA, over 50,000 miles of new gas pipeline per year due to shale gas
- > In U.S., 250,000 miles of new tel-com cables per year
- > In U.S., 850,000 new houses in 2012
- > In U.S., 6,500 miles of new road each year

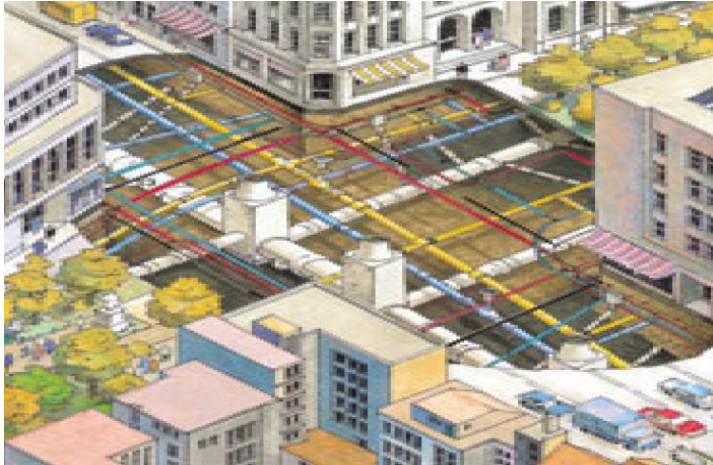
# *Increasing Risk*

The implications of poor utility records are far reaching and directly impact the public through:

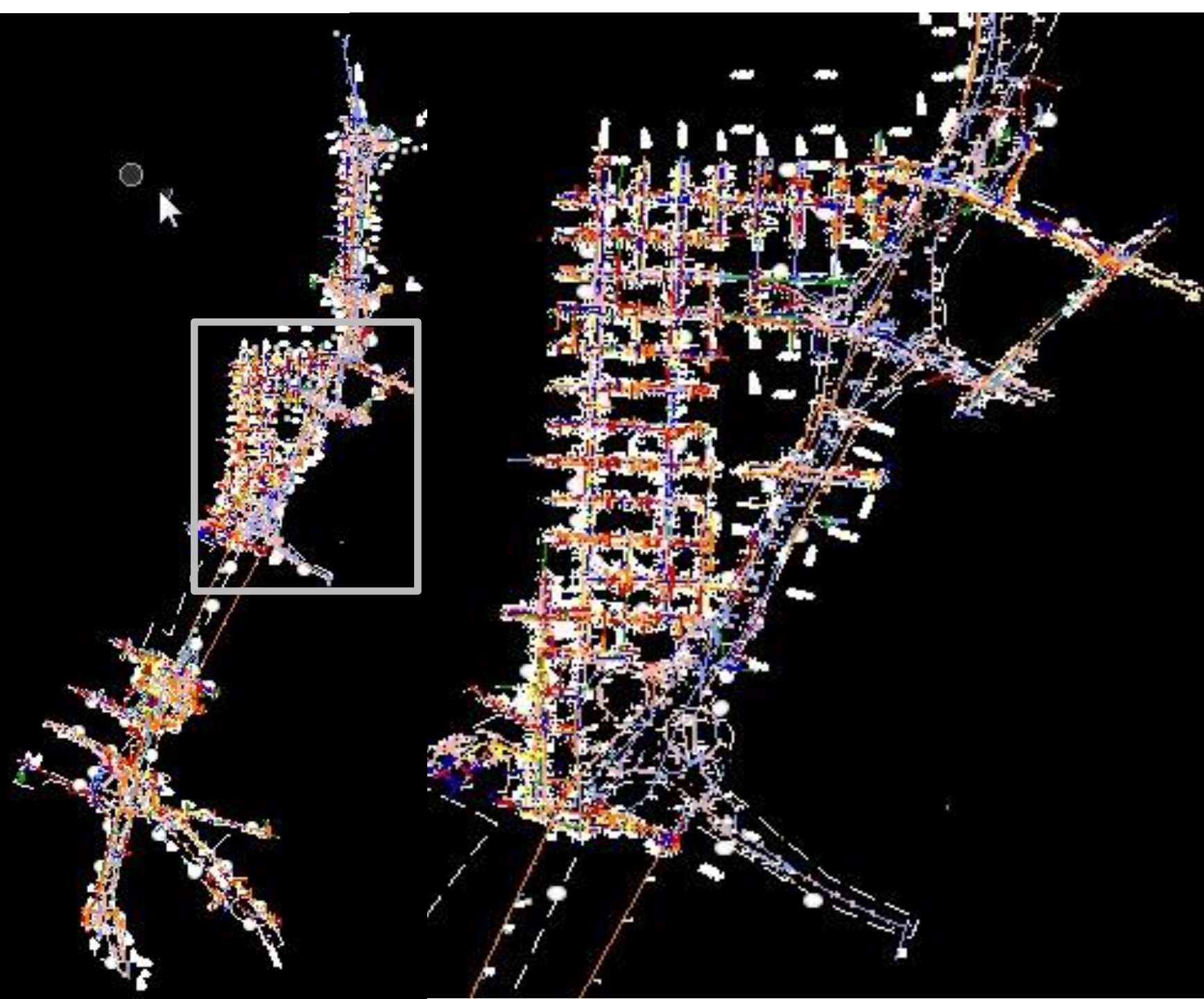
1. rising risk and costs for civil projects and private developments;
2. increased costs for utility infrastructure relocation activities;
3. worker and public safety issues; and
4. disrupting public and commerce overwhelming dependence on web services.

# *Increasing Congestion*

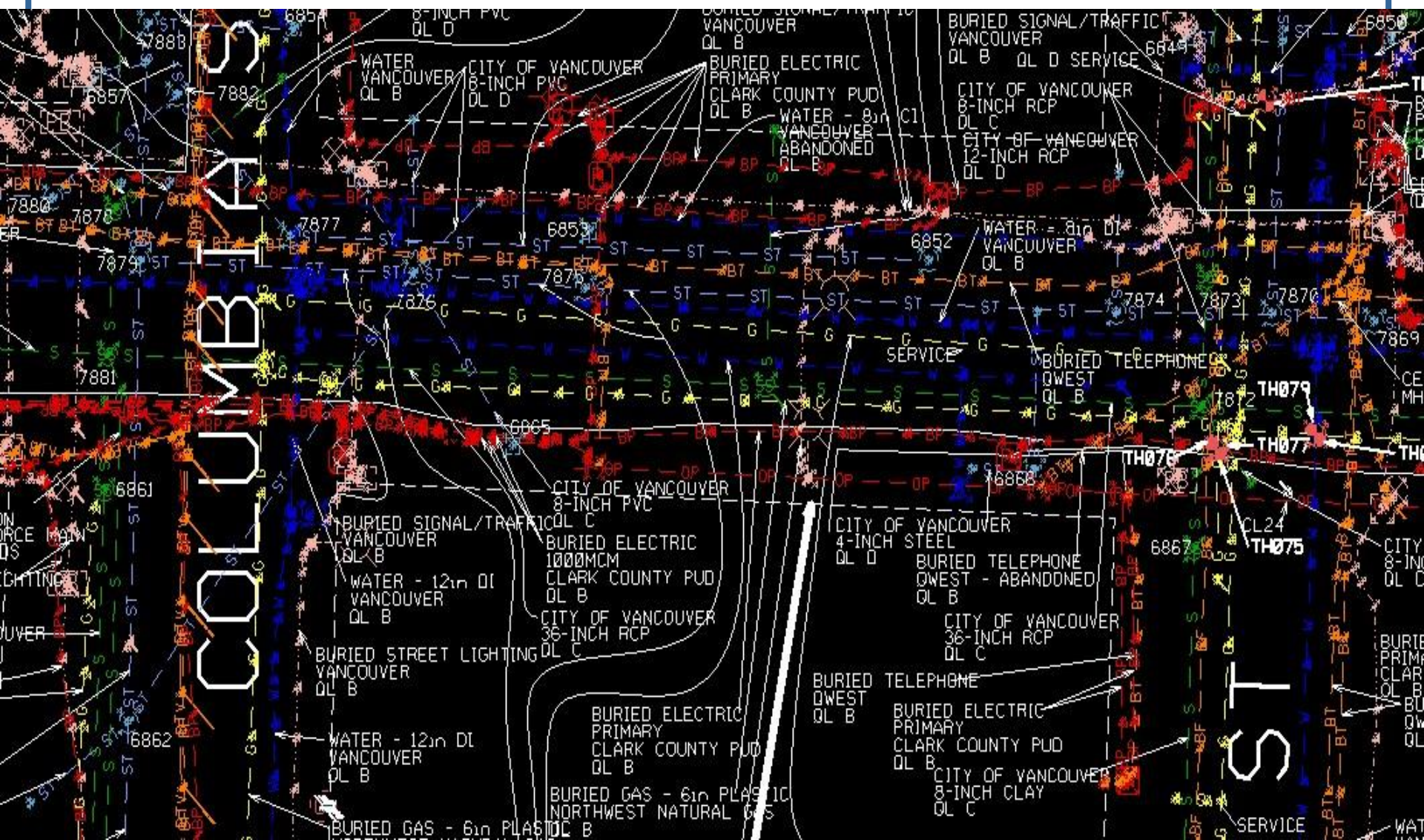
Utility congestion at problematic levels within public roadway corridors.













ABANDONED?

QL B

— G — G —

— G — G —

BURIED GAS - 21n STEEL

NORTHWEST NATURAL GAS

QL B

— ST — ST — ST — ST —

CITY OF VANCOUVER

8-INCH PVC

QL D

— ST — ST — ST — ST —

— BT — BT — BT — BT —

— OTV — OTV — OTV — OTV —

— OT — OT — OT — OT —

— BT — BT — BT — BT —

— OTV — OTV — OTV — OTV —

— OT — OT — OT — OT —

CLARK COUNTY PUD

AERIAL POWER

SECONDARY

QL B

CLARK COUNTY PUD

AERIAL POWER

PRIMARY

QL B

BURIED STREET LIGHTING

VANCOUVER

6789

TH036

6785

SERVICE

CITY OF VANCOUVER

8-INCH RCP

QL C

— ST — ST —

COMCAST

AERIAL CATV

QL B

6787

CITY OF VANCOUVER

6-INCH RCP

QL C

CLARK COUNTY PUD

AERIAL POWER

SECONDARY

QL B

CLARK COUNTY PUD

AERIAL POWER

PRIMARY

QL B

BURIED STREET LIGHTING

VANCOUVER

6793

TH037

BURIED STREET LIGHTING

VANCOUVER

QL B

QWEST

(2) 4-INCH PVC CONDUIT

QL B

BURIED STREET LIGHTING

VANCOUVER



Finding this stuff by any means other than whole-scale excavation is challenging.

It's better to document it accurately as it is going in



# Scope

Develop a new standard for the collection and submittal of utility “as-built” records and publish as an ASCE non-mandatory consensus standard. Stem from:

- ◆ CI/ASCE 38 & CSA S250-11
- ◆ International Organization for Standardization (ISO)
- ◆ Open Geospatial Consortium (OGC)
- ◆ Federal Geographic Data Committee (FGDC)
- ◆ American National Standards Institute (ANSI)
- ◆ National Oceanic and Atmospheric Administration (NOAA) / National Geodetic Survey (NGS) of the U.S. Department of Commerce
- ◆ Pipeline Open Data Standard (PODS)
- ◆ American Society of Mechanical Engineers (ASME)

## Mapping of underground utility infrastructure



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**Table 1**  
**Positional accuracy of as-built records**  
(See [Clauses 5.5](#) and [5.6.2](#) and [Figures 2–6.](#))

Accuracy level	Description	Reference
1	Accurate to within $\pm 25$ mm in the x, y, and z coordinates, and referenced to an accepted geodetic datum with a 95% confidence level.	Absolute
2	Accurate to within $\pm 100$ mm in the x, y, and z coordinates, and referenced to an accepted geodetic datum with a 95% confidence level.	Absolute
3	Accurate to within $\pm 300$ mm in the x, y, and z coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative
4	Accurate to within $\pm 1000$ mm in the x, y, and z coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative

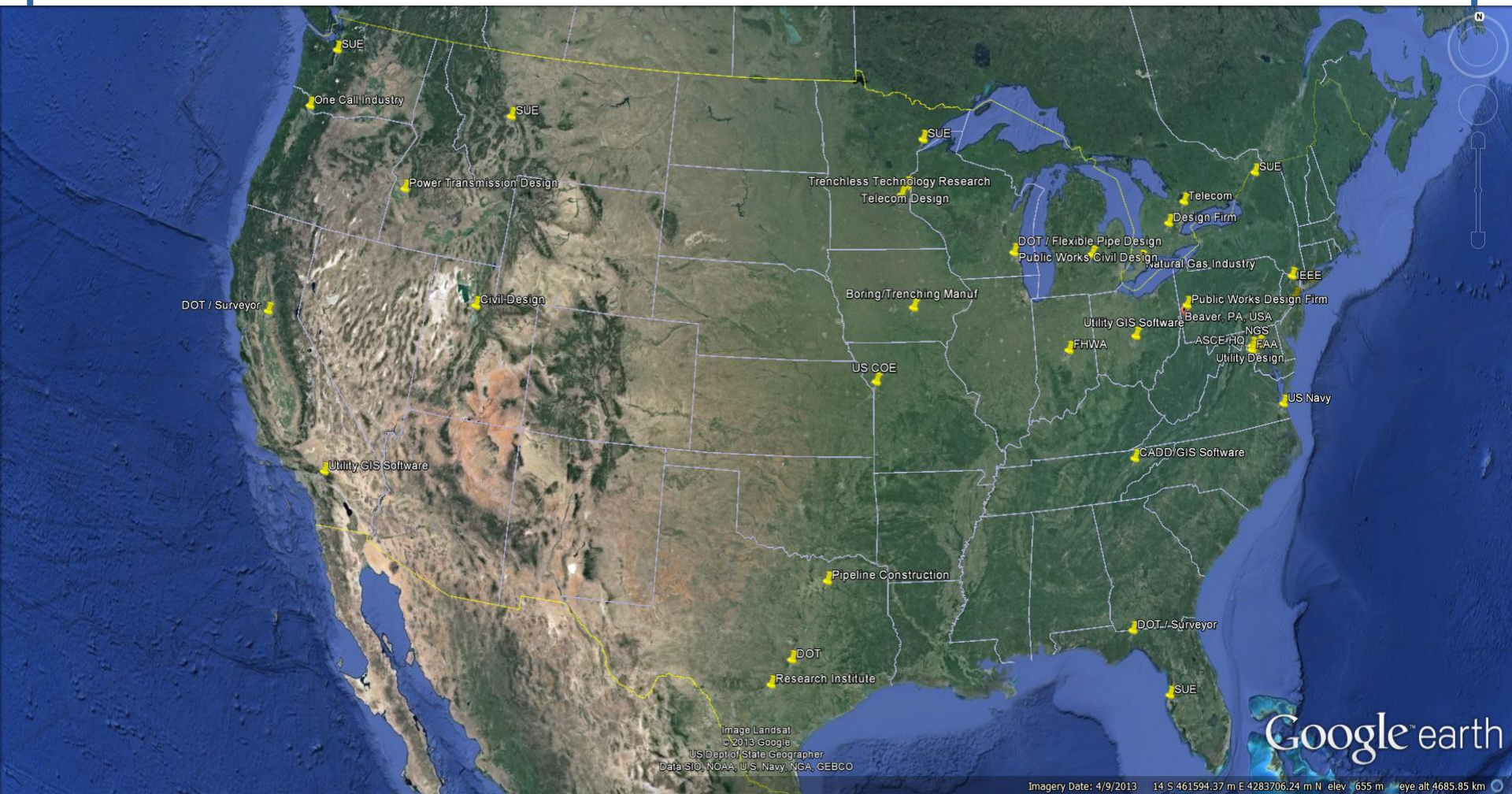
**Table 2**  
**Positional accuracy of supplementary utility infrastructure records**  
(See [Clause 5.7](#) and [Figures 2–6.](#))

Accuracy level	Description	Reference
5	Accurate to within $\pm 1000$ mm in the x and y coordinates, and referenced to an acceptable geodetic datum or topographical and cadastral features with a 95% confidence level.	Absolute or relative
0	No information available related to spatial accuracy.	

# *Participating Organizations*

- ◆ American Association of State Highway and Transportation Officials (AASHTO)
- ◆ U.S. Department of Transportation (USDOT) Federal Highway Administration (FHWA)
- ◆ U.S. Army Corps of Engineers and U.S. Navy
- ◆ U.S. NOAA National Geodetic Survey
- ◆ Research - Virginia Tech, TTI
- ◆ Pipeline Open Data Standard (PODS)
- ◆ Canadian Standards Association (CSA)
- ◆ Construction Industry
- ◆ Design and SUE Consultants
- ◆ Survey & Mapping Industries
- ◆ GIS & CADD Industries
- ◆ Utility Industry – Telecomm, Natural Gas, Power, PW
- ◆ DOTs: FDOT





# Sub Tasks



- ◆ **Collection**-Gathering of all required information during installation



- ◆ **Administration**-Ability to meet all state statutes, regulations and harmonize with existing standards



- ◆ **Exchange**-Ensure that data meets all current digital interchange standards for current and potential future uses





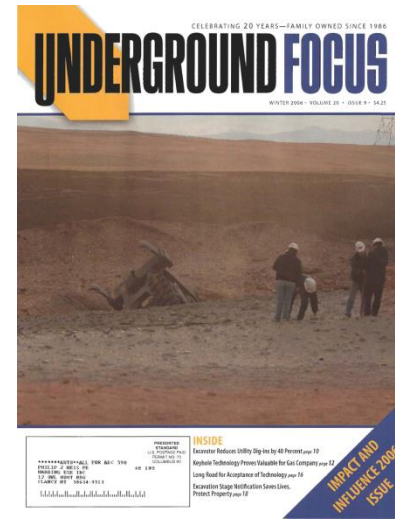
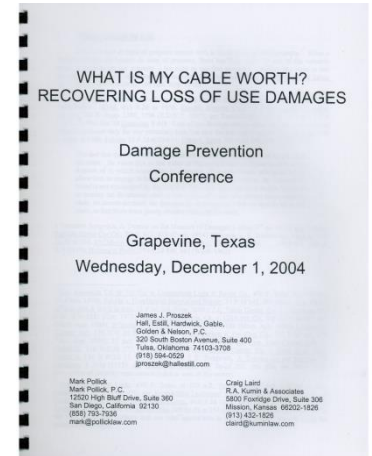
# Collection

- ◆ Trenchless Installations
- ◆ Open Cut Installations
- ◆ Surface Appurtenances
- ◆ Overhead installations
- ◆ Spatial Positioning and Metadata (NSRS)
- ◆ Attributes (non-spatial metadata)
- ◆ RFID (radio-frequency identification)
- ◆ Remote Sensing Technologies and Data



# Administration

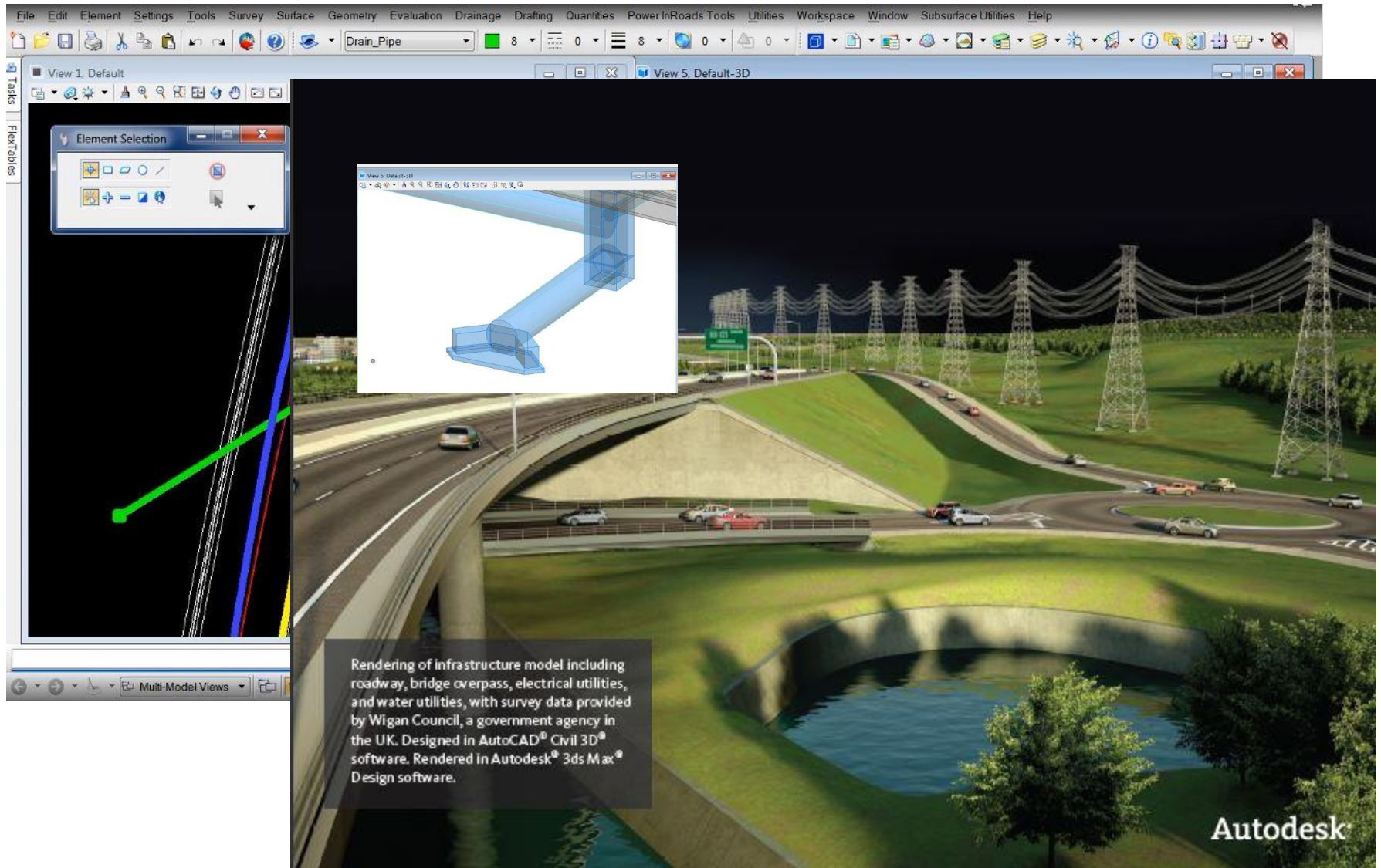
- ◆ State Statutes
- ◆ Existing Standards
  - ✓ (ASCE 38, CSA S250, PODS, etc.)
- ◆ Existing Regulations
- ◆ Legal implications
- ◆ Manuals of practice





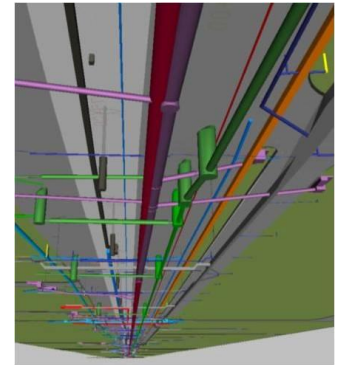
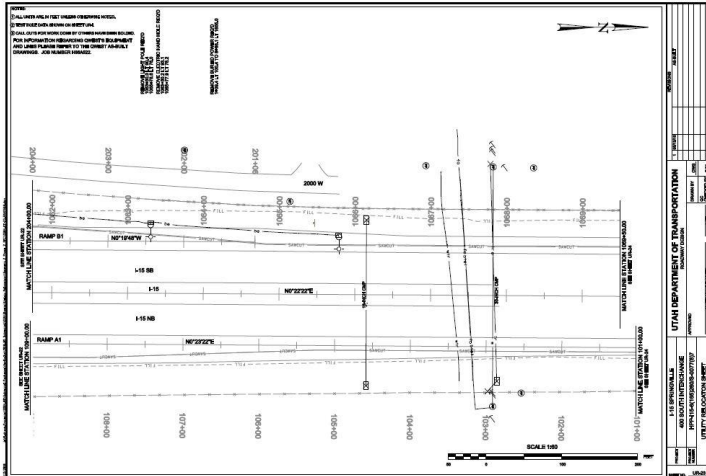
# Exchange

- ◆ **Data Interchange Standards** - OGC, VISTA, INSPIRE, IEC (IEEE of rest of world), ISO, ANSI
- ◆ **Potential and Future Uses of the Data:**
  - Proactive and Real-Time Planning
  - Asset Management
  - Effective Damage Control Practices
  - CAD/CADD, GIS, CIM, 3D Modeling, VDC
  - Clash Detection, Sensitivity Modeling
  - Machine Control



# Schedule

The committee is established and approved by the ASCE Codes and Standards Committee. Inaugural meeting Savannah, GE May 3<sup>rd</sup>, 2013. Develop, review and finalize the standard for the first balloting by the end of 2016.



## *Putting ASCE 38 and CSA S250 (ASCE XX) Together: A Sample Spec for a Water Development Project*

- ◆ Perform QLD mapping of all utilities within the footprint of the reservoir, treatment facility, and potential paths for the transmission and connection piping early in the planning stage of the project.
- ◆ Determine piping corridors that make sense given existing utility presence.
- ◆ At time of early design, further upgrade the reliability of utility information by attempting to gather QLB data on existing utility mains and commercial services within the selected corridors.
- ◆ Where necessary on critical existing utilities, upgrade at selected points to QLA.
- ◆ Use this mapping to either design around or determine relocation designs for existing utilities.

- ◆ Due to the critical nature of the raw water transmission pipe, document its location at Accuracy Level 1.
- ◆ Also at Level 1:
  - ✓ Document the location of the connection mains
  - ✓ Document all relocated utilities that are transmission facilities
  - ✓ Document all Fiber Optic cables
- ◆ At Level 2
  - ✓ Relocated distribution piping and cables
- ◆ At Level 3
  - ✓ New and Relocated Commercial service lines
- ◆ At Level 4
  - ✓ Relocated residential service lines



*Thank You*

Questions?

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